

Claims

What is claimed is:

1. A method for processing a message in a wireless communication network comprising the steps of:
 - 5 receiving at least one portion of the message at a computing device from at least one of a plurality of access points when the at least one access point is in range of a mobile client in the wireless communication network; andmerging received portions of the message into a single portion when two or more portions of the message are received at the computing device.
 - 10 2. The method of claim 1, wherein the plurality of access points are disposed in a vicinity along a path of the mobile client.
 - 15 3. The method of claim 1, wherein the computing device is a gateway to an external computer network.
 4. The method of claim 3, wherein the step of receiving at least one portion of the message comprises the steps of:
 - merging the portions of the message at each access point; and
 - receiving at least one merged portion of the message at the gateway from the at least one of a plurality of access points.
 - 20 5. The method of claim 3, wherein the step of merging received portions of the message into a single portion comprises the steps of:
 - determining when all portions of the message are received at a single gateway;
 - waiting a specified time interval when at least one portion of the message was not received at the single gateway;

determining when additional portions of the message were received at the single gateway after waiting the specified time interval; and

merging the additional portions of the message with previously transmitted portions of the message when additional portions of the data were received at the single gateway in
5 the specified time interval.

6. The method of claim 5, wherein the step of merging received portions of the message into a single portion further comprises the step of transmitting an error to a sending socket when no additional portions were transmitted in the specified time interval
10 and all portions of the message were not received at the single gateway.

7. The method of claim 3, wherein the step of merging received portions of the message into a single portion comprises the step of sending the message to the external computer network when all portions of the message were received at the single gateway.

8. The method of claim 3, wherein the step of merging received portions of the message into a single portion comprises the steps of:

determining when all portions of the message are received at a single gateway;
waiting a specified time interval when a last portion of the message has not been received at the gateway;

20 determining when an additional portion of the message was received at the single gateway during the specified time interval;

determining when an additional portion of the message received at the single gateway during the specified time interval is the last portion of the message;

determining when the request is complete when the last portion of the message was received at the gateway from the at least one of a plurality of access points;

reassembling the portions of the message at the single gateway when the message is complete; and

transmitting the complete reassembled message to the external computer network.

5 9. The method of claim 8, wherein the step of merging received portions of the message into a single portion further comprises the step of erasing a cache at the gateway when an additional portion of the message was not received at the single gateway during the specified time interval.

10 10. The method of claim 8, wherein the step of merging received portions of the message into a single portion further comprises the step of requesting remaining portions from appropriate gateways when the message is not complete.

11. The method of claim 3, further comprising the step of transmitting the message from the gateway to the external computer network.

15 12. The method of claim 11, wherein the step of transmitting the message from the gateway to the external computer network comprises the steps of:

determining when a gateway can handle the message;

determining when the mobile client is in range when the gateway can handle the message;

20 transmitting the message from the gateway to the external computer network when the mobile client is in range; and

transmitting the message from the gateway to an alternate gateway when the gateway cannot handle the message or when the mobile client is not in range.

13. The method of claim 3, wherein the number of gateways correlates to the number of access points.

14. The method of claim 3, further comprising the steps of:
establishing an Internet Protocol (IP) address for the mobile client through an
5 onboard proxy, wherein the onboard proxy is mobile in conjunction with the mobile client; and

receiving at least one portion of the message at the at least one of a plurality of access points from the mobile client through at least one onboard proxy.

15. The method of claim 14, wherein the step of establishing an IP address
10 comprises the steps of:

obtaining a pool of dynamic IP addresses from the gateway of the external computer network at an onboard proxy;
assigning an IP address to a requesting mobile client; and
obtaining an additional pool of dynamic IP addresses when there are no remaining
15 IP addresses in the pool of dynamic IP addresses for requesting mobile clients.

16. The method of claim 14, wherein the step of receiving at least one portion of the message at the at least one of a plurality of access points from the client through at least one onboard proxy comprises the steps of:

20 receiving the message from a mobile client at an onboard proxy;
receiving the message from the onboard proxy at a master onboard proxy; and
storing the message in a buffer in the master onboard proxy.

17. The method of claim 14, wherein the step of receiving at least one portion of the message at the at least one of a plurality of access points from the client through at least one onboard proxy comprises the steps of:

- determining when an access point is in range of a first onboard proxy;
- 5 receiving at least a portion of the message at an access point when the access point is in range of the first onboard proxy and determining when the transmission of the message was complete;
- determining when an access point is in range of an alternate onboard proxy when an access point is not in range of the first onboard proxy; and
- 10 receiving at least a portion of the message at an access point from the alternate onboard proxy after the message was transmitted to the alternate onboard proxy from the onboard proxy, when an access point is in range of the alternate onboard proxy; and
- determining when the transmission of the message was complete.

18. The method of claim 14, wherein the number of onboard proxies is determined by attributes of the mobile clients.

19. The method of claim 14, further comprising the step of storing the message in the onboard proxy when the plurality of access points are unavailable.

20. The method of claim 1, wherein the computing device is an onboard proxy in a mobile vehicle of the wireless communication network.

20 21. The method of claim 20, further comprising the step of transmitting the message from the onboard proxy to the mobile client.

22. The method of claim 20, wherein the step of receiving at least one portion of a message comprises the steps of:

determining when the onboard proxy received the complete message;

transmitting remaining portions of the data back to a gateway of an external

5 computer network from the at least one access point when the onboard proxy did not receive the complete message; and

notifying the gateway when the onboard proxy received the complete message.

23. The method of claim 20, wherein the step of receiving at least one portion of a message comprises the steps of:

10 determining when an onboard proxy is in range of an access point;

receiving at least one portion of the message at the onboard proxy when the onboard proxy is in range of the access point;

determining when all portions of the message were received at the onboard proxy;

processing the message at the onboard proxy when all portions of the message

15 were received at the onboard proxy; and

transmitting at least one portion of the message to an appropriate alternate access point when an onboard proxy is not in range, or when portions of the message were not received by the onboard proxy.

20 24. The method of claim 20, further comprising the steps of:

decomposing the message into portions at the gateway; and

receiving the portions of data at multiple access points when reception at a single access point is not possible.

25. The method of claim 20, further comprising the step of receiving at least one portion of the message from an external computer network at the at least one of a plurality of access points through at least one gateway.

5 26. The method of claim 25, wherein the step of receiving at least one portion of the message from an external computer network comprises the steps of:

receiving the message from the external computer network at the gateway;

marking portions of the data as unacknowledged;

setting a counter to zero;

10 determining an appropriate access point;

receiving unacknowledged portions of the message from the gateway at the appropriate access point;

incrementing the counter by one;

15 determining when all portions of the message were received at the appropriate access point;

determining when the counter has exceeded a specified maximum value when all portions of the message were not received at the appropriate access point; and

20 determining remaining unacknowledged portions of the message remaining in the gateway from acknowledgments sent by the appropriate access point when the counter has not exceeded a specified maximum.

27. The method of claim 25, wherein the step of receiving at least a portion of the message from an external computer network comprises the steps of:

determining when the gateway can handle the message;

25 determining when the mobile client is in range when the gateway can handle the message;

receiving the message at at least one access point when the mobile client is in range; and

transmitting the message from the gateway to an alternate gateway when the gateway cannot handle the message or when the mobile client is out of range.

5 28. Apparatus for processing a message in a wireless communication network, the apparatus comprising:

 a memory; and

 at least one processor coupled to the memory and operative to: (i) receive at least one portion of the message at a computing device from at least one of a plurality of access 10 points when the at least one access point is in range of a mobile client in the wireless communication network; and (ii) merge received portions of the message into a single portion when two or more portions of the message are received at the computing device.

29. The apparatus of claim 28, wherein the computing device is a gateway to an external computer network.

15 30. The apparatus of claim 28, wherein the computing device is an onboard proxy in a mobile vehicle of the wireless communication network.

31. An article of manufacture for processing a message in a wireless communication network, comprising a machine readable medium containing one or more programs which when executed implement the steps of:

20 receiving at least one portion of the message at a computing device from at least one of a plurality of access points when the at least one access point is in range of a mobile client in the wireless communication network; and

merging received portions of the message into a single portion when two or more portions of the message are received at the computing device.